



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Yasunaga KAYAMA

Group Art Unit: 2851

Application No.: 09/713,215

Examiner: P. Kim

Filed: November 16, 2000

Docket No.: 107314

For: EXPOSURE APPARATUS AND METHOD THAT EXPOSES A PATTERN ONTO A SUBSTRATE

REQUEST FOR RECONSIDERATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In reply to the June 4, 2004 Office Action, the shortened statutory period for reply being extended by the attached Petition for Extension of Time, reconsideration of this application is respectfully requested in light of the following remarks. Claims 1, 3-7, 9-11, 14-18, 20-24, 26, 28-30, 32-36, 38, 40-46 and 48-68 are pending.

Applicant thanks Examiner Kim for the courtesies extended to Applicant's undersigned attorney during the November 1 interview. At the interview, it was agreed that the rejection under 35 U.S.C. §112, second paragraph would be withdrawn, and that the rejections under 35 U.S.C. §103(a) likely would be withdrawn, subject to further consideration by the Examiner. The substance of the interview is summarized below.

I. Objected-to claims

Applicant notes with appreciation the identification of allowable subject matter in claims 16, 17, 29, 41, 47 and 53. However, the features of claim 47 already have been

incorporated into independent claim 45, and claim 47 has been cancelled. During the interview, the Examiner indicated that the inclusion of claim 47 was a typographical error. In any event, all pending claims are allowable for at least the reasons set forth below.

II. 35 U.S.C. §112, second paragraph rejection

Claims 56-63 stand rejected under 35 U.S.C. §112, second paragraph. The Office Action asserts that the structural relationship between the "plate" and the "flange" of claim 56 is not clear, and that the specification only describes the piezoelectric elements as being coupled to the flange (34), not to a plate. This rejection is respectfully traversed.

Fig. 4 clearly shows an embodiment in which the piezoelectric elements 36 are attached to a plate 42, which in turn is attached to the flange 34. Also see, for example, page 11, line 18 - page 12, line 8, especially page 11, lines 24-27. Thus, claim 56 and its dependent claims are accurate, clear, and consistent with the specification.

III. 35 U.S.C. §103(a) rejection based on Akimoto et al., Hayashi and Takahashi et al

Claims 1, 3-7, 9-11, 14, 15, 18, 20-24, 26, 28, 30, 32-36, 38, 40 and 54 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 6,359,688 to Akimoto et al. in view of U.S. Patent No. 6,036,162 to Hayashi and U.S. Patent No. 6,008,885 to Takahashi et al. This rejection is respectfully traversed.

Based upon page 7, lines 2-4 and page 6, lines 5-18 of the Office Action, it appears that the Office Action is relying on Hayashi for allegedly teaching driving of a holder in a two-dimensional plane. The references, individually or collectively, do not suggest the combination of features recited in independent claims 1, 18 and 30. The Office Action picks and chooses elements and teachings from amongst the references in an attempt to cobble together the combinations of features recited in claims 1, 18 and 30, without any suggestion in the references to do so. Thus, the Office Action engages in impermissible hindsight, and the rejection should be withdrawn.

While Akimoto et al. teaches the use of piezoelectric elements, the piezoelectric elements of Akimoto et al. actuate a wafer holder in the Z-direction, parallel to the optical axis of the projection system. See, e.g., col. 6, lines 32-39, col. 11, lines 14-30 and col. 12, lines 1-17. Akimoto et al does not disclose or suggest using piezoelectric (or any other) elements to: (1) actuate a projection system holder; (2) actuate a projection system holder (or any other holder) in a two dimensional plane perpendicular to the projection system optical axis; or (3) actuate a projection system holder (or any other holder) in response to a detection result of a detector (that detects displacement information about the projection system) to suppress a strain of the holder resulting from a resonance of the projection system. Akimoto et al. merely drives the wafer stage in the optical axis direction to compensate for movement of the projection system. Akimoto et al. does not "suppress a strain of the holder resulting from a resonance of the projection system."

Fig. 7 of Hayashi (which is referenced in the Office Action) discloses an arrangement in which a mounting plate 206 supports a wafer stage 220 and a column 224 (which supports the projection system and the reticle stage). See, e.g., col. 18, lines 7-17 of Hayashi. Electromagnetic actuators 231A-231C (having movable elements 235A-B and 234 mounted on the column 224) are controlled to apply forces in a plane perpendicular to the optical axis of the projection system to suppress vibration of the entire projection apparatus in the Y direction and in a direction about the Z-axis. See, e.g., col. 18, lines 62-65 and col. 19, lines 53-58.

Thus, Hayashi does not disclose or suggest: (1) a system in which a damper isolates the projection system from the stage; (2) an actuator having a pair of piezoelectric elements coupled to the holder of the projection system to actuate the holder in a two dimensional plane perpendicular to an axis of the projection system; and (3) a driver connected to the actuator to drive the actuator to suppress a strain of the holder resulting from a resonance of the

projection system. The actuators 231A-C of Hayashi do not suppress a strain of the holder resulting from a resonance of the projection system.

Moreover, there is no suggestion in the references to replace the electromagnetic actuators 231A-231C of Hayashi with piezoelectric actuators, or to place piezoelectric actuators on the column 224 of Hayashi. Such a modification is counter-intuitive of the teachings of Hayashi, because Hayashi uses actuators (the electromagnetic actuators) that apply a force between support pillars 204A/204B and the projection apparatus (including the column 224) to suppress movement of the projection apparatus without interconnecting the pillars and the column so that vibrations are not transmitted from the pillars to the column. Merely placing piezoelectric actuators on the pillar 224, as proposed in the Office Action, would not achieve the goals of Hayashi because it would not cause force to be applied between the pillars and the column. Placing the piezoelectric actuators between the pillars and the column could result in transmission of vibrations from the pillars to the column, which is against the teachings of Hayashi.

Takahashi et al. does not overcome the deficiencies noted above.

Accordingly, the combinations of features recited in independent claims 1, 18 and 30 are not disclosed or suggested by the references relied upon in the Office Action. Withdrawal of the rejection is requested.

IV. 35 U.S.C. §103(a) rejection of claims 42-44, further in view of Watson

Claims 42-44 stand rejected under 35 U.S.C. §103(a) over Akimoto et al. in view of Hayashi and Takahashi et al., and further in view of U.S. Patent No. 5,959,427. This rejection is respectfully traversed.

Watson does not overcome the deficiencies with respect to the rejection of claims 1, 18 and 30, from which claims 42-44 respectively depend. Thus, these claims are patentable for at least the same reasons as claims 1, 18 and 30.

V. 35 U.S.C. §103(a) rejection based on Iwamoto and Akimoto et al.

Claims 1, 3-7, 9-11, 14, 15, 18, 20-24, 26, 28, 30, 32-36, 38, 40, 45, 46, 48-52 and 54-68 stand rejected under 35 U.S.C. §103(a) over U.S. Patent No. 5,781,277 to Iwamoto in view of Akimoto et al. This rejection is respectfully traversed.

At page 5, lines 14-16, the Office Action recognizes that Iwamoto "does not disclose an actuator having a pair of piezoelectric element [sic] coupled to the holder and actuates [sic] the holder in a two dimensional plane perpendicular to the axis of the projection system." In addition, at page 7, lines 2-4, the Office Action recognizes that Akimoto et al. "does not teach piezoelectric element coupled to a projection system holder and actuate [sic] the holder in a two dimensional plane." Thus, the Patent Office cannot base its rejection on only Iwamoto and Akimoto et al. Although it is not stated on page 5 of the Office Action, it appears from page 6, lines 5-18 of the Office Action that the Patent Office further relies upon Hayashi et al. However, for the reasons set forth previously, Hayashi et al. when combined with the other references does not disclose or suggest the combinations of features recited in independent claims 1, 18 and 30.

Regarding independent claim 45, as noted above, the features of claim 47 already have been incorporated into claim 45. Accordingly, it is believed that claim 45 and its dependent claims are patentable. For example, the applied references do not disclose or suggest an actuator coupled to a flange of a projection system (a support member supporting the projection system through the flange) and a driver connected to the actuator to drive the actuator to suppress an influence of resonance of the projection system.

The combinations of features recited in independent claims 56 and 64 also are not disclosed or suggested by the applied references. With respect to claim 56, the references do not disclose or suggest, *inter alia*, a plate coupled to the flange of a projection system, a pair of piezoelectric elements coupled to the plate, and a driver connected to the pair of

piezoelectric elements to suppress a vibration of the projection system. With respect to claim 64, the references do not disclose or suggest, *inter alia*, a pair of piezoelectric elements coupled to the support member that supports a projection system, the pair of piezoelectric elements being actuatable in a two dimensional plane perpendicular to an axis of the projection system, and a driver connected to the pair of piezoelectric elements to actuate the pair of piezoelectric elements to suppress a vibration of the projection system. Accordingly, claims 56 and 64, as well as their dependent claims, are patentable over the applied references.

VI. Conclusion

In view of the foregoing, Applicant respectfully submits that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,

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MAC/ms

Attachment:

Petition for Extension of Time

Date: November 2, 2004

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